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From the above data, I conclude that the incubation period is usually about 13 or 14 days and the period from hatching to leaving the nest, not less than two weeks, generally longer.

*2930 Prospect Ave., Cleveland, Ohio.*

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## THE ENGLISH SPARROW (*PASSER DOMESTICUS*) AND THE MOTOR VEHICLE.

BY W. H. BERGTOLD.

The writer does not hesitate to express and record his conviction that there has been a very notable decrease in the number of English Sparrows in Denver, during the past few years; this decrease amounts, almost, to disappearance within the business area. It is now, unfortunately, impossible to fix the exact beginning of this decrease, but the writer feels safe in saying that it has been going on for at least three or four years.

It will be of interest, and of some importance to analyze the conditions which, probably, have been, and are, bringing about a much-to-be desired diminution in the numbers of this exotic bird.

Fifteen years ago one could see on any of the crowded business streets of Denver, dozens, nay, hundreds of English Sparrows, and the air was then resonant with their shrill notes of love, war and alarm; during the past few months the writer has taken special notice of the abundance of this sparrow in the down-town districts, often making special excursions through various streets for the express purpose of estimating such abundance. It is the plain truth when the statement is made that not even a single sparrow has been seen on the business streets during any of the walks; the writer frequently walks from his office to various places of business, a mile or more, and does not *hear* any English Sparrows, much less see them. If this change be pointed out to the average citizen, he suddenly awakens to its truth and asks "why?"

There is a well grassed and timbered area surrounding the Court House opposite the writer's office and fifteen years ago both its trees and lawn were simply alive with English Sparrows, and their dis-

cordant cries made a din too well known to need describing anew. The trees also served as night roosting places for these sparrow hordes, a fact plainly evidenced by the filthy and heavily chalked condition of the underlying sidewalks. It seems to the writer that a conservative estimate of the sparrow population of this area as the conditions were at the time, could not have been less than one thousand birds; a recent careful daily examination of this locality, especially during the past few weeks reveals a remarkable, and at the same time, a most gratifying change.

The following quotations from the writer's notes are far more impressive than any detailed description would be, which he might attempt to write.

"Oct. 10., 1919—11.30 A. M., Bright warm day—Saw five sparrows only, about Court House, and heard five others. There are only two or three small chalked areas on the sidewalks.

Oct. 11, 1919—Warm clear day; saw six sparrows on Court House premises, all were eating of the seeds of "wire grass" growing in the lawn; heard three others in the trees and saw two on adjacent buildings.

Oct. 13, 1919—Bright warm day, 10 A. M., nineteen sparrows seen on or about Court House but some of these may have been "repeats."

Oct. 15, 1919, 4.30 P. M.—Cold and cloudy. Saw two sparrows, and heard three others about Court House. House Finches singing merrily.

Oct. 21, 1919, 11.30 A. M.—Cold and cloudy; three sparrows seen on Court House grounds.

Oct. 22, 1919, 10 A. M.—Mild and clear; nine sparrows seen and five heard about Court House square.

Oct. 24, 1919, 9.30 A. M.—Cold and misty—Saw ten and heard two sparrows about Court House.

These notes show that there has been a remarkable diminution in the numbers of English Sparrows about this locality, and the same condition of decrease can be said to obtain in the residential districts but to a lesser degree.

It has been shown (Auk Vol. XXX p. 70) that the English Sparrow was responsible for the destruction of 16% of the nestling House Finches hatched in nesting boxes provided for that purpose by the writer; during the past three years the writer's boxes for nesting finches have been disturbed very little by English Sparrows, only one of a considerable number of broods having been destroyed by this sparrow. In previous years the writer spent a good deal of his spare time, when at home, in protecting his House

Finches from the ravages of the English Sparrow, but it has not been at all necessary during the past three years. This relief from sparrow depredations, it would seem, has not been due to increased protection, but rather to the absence of sparrows; the fact is there have been fewer sparrows to harass the finches. It was the small loss of nests, eggs and nestling House Finches, through sparrow depredations, which focused the writer's attention on the decrease of this species, and lead him to make extended observations on pertinent conditions and facts.

The writer does not wish to be understood as stating that the English Sparrow pest had ceased in Denver; far from it, but that there is a marked decrease seems beyond cavil and that this decrease is still going on, probably at an accelerating pace, is almost a demonstrated fact to the writer.

To what can this changed condition be attributed? Increase of enemies, mortality by disease, changing environment, or lessening of food supply, all of these, and perhaps more, might be cited as possible causes. So far as the writer can determine (or learn) there has been no increase of any natural enemy of this sparrow, nor are there any indications of a wide spread decimating disease infecting and killing off this species; there is also little or no appreciable change in the sparrow's local environment, for there has been very little disturbance of shade trees, or loss of lawn areas in the areas wherein there has been the most noticeable diminution of sparrow numbers, and there are as many, or more, favorable nesting sites as ever. There has been, however, an enormous loss of food, a factor admittedly repressing a given species as much, if not more, than any other single condition. The loss of food comes about through an unexpected reaction following the appearance of new manifestations of civilization.

With this in view a glance at the horse population of the city of Denver is at once interesting and illuminating—the officials of the Denver Union Water Co., kindly supplied the writer with data which gave an approximate idea of the number of horses in Denver during several different past years. From these data we find that the number of horses in Denver in 1897 was 2601, in 1907, 5904, and in 1917, 3832. There were probably quite a good many in excess of these figures each year, but the figures

just given show the minimum number of horses that were supplied with water by the Water Company. These data show that there was a decrease of 33% in the number of horses in Denver between 1907 and 1917, notwithstanding that the human population had grown steadily and that the number of houses had multiplied extensively. This steady increase of human population, and the increase of houses obviously made for more garbage, etc., which however is only sparingly utilized by the English Sparrow, if it can get grain, etc. It is, however, not on this source of food that this species lives in the urban districts. The writer is thoroughly convinced that this species lives, especially in the downtown districts, almost exclusively on horse manure. To test the above mentioned data on horses, a rough check on the equine population in Denver was undertaken last summer, through the making of a count of the horses seen on the streets, while the writer drove about in various parts of the city. Inasmuch as most of such driving is done in the residential portions of the city, many drives were directed through the business sections, particularly in the wholesale districts, where the harnessed horse is still much in evidence.

It is highly probable that data gathered in this way include many "repeats," an error which would, in effect, strengthen conclusions as to a diminishing horse population. The highest number of harnessed horses seen on any single day on the streets of Denver was 140, and the lowest was 11 (no counts having been made on Sundays or holidays), the average of fifteen days in July having been 70. While the writer has no earlier collected data to submit in parallel with these just given it seems self-evident that this average of 70 horses per day is a striking decrease from the average which probably obtained five years ago. Unless the writer's recollections are unreliable and hazy, it would seem to him that ten years ago two or three times that number of horses would have come under observation during the same period of time. There can be, however, little question concerning the reality of the "vanishing horse," for it has been shown (*Saturday Evening Post*, Sept. 13, 1919) that the number of horses in New York City recently declined from 108,036 to 75,740, and it is probable that what amounts to decrease (by displacement or

substitution) has occurred also in suburban areas, since statistics seem to show a decrease or displacement of 33% of the horses in one of the Dakotas. Finally in this connection it can be said that early in November 1919 there were enough tractors in use in Colorado to displace 16,000 horses, which shows that conditions reported in New York City and in Dakota also obtain in the state of Colorado.

One can ascertain approximately how much difference the smaller horse population has made in the amount of refuse removed from the streets of Denver, through the Street Cleaning Department records. Officials of this Department have kindly furnished some interesting facts shedding light on this question of street sweepings, etc.

A record of the cubic yards of street sweepings, and the number of blocks whence such sweepings are derived, is kept by this Department of civic activities; before and up to 1911 only the undivided total sweeping yardage was recorded, but in recent years the yardage gathered by the sweeping machines, and by the "push cart brigade" has been differentiated and separately recorded. A tabulation of the machine sweepings shows that in 1911, 38,000 cubic yards, in 1914, 30,000 cubic yards, and in 1919, 13,000 cubic yards were collected, the figures for 1914 and 1919 being estimated for the whole year from the September sweepings of the respective years, September having been chosen because it is one of the driest months, and hence there is then little or no natural cleaning of the streets by rain. These data, just given, are based on the assumption that the surface blockage remained stationary from 1911 to 1919, which is far from being the case. Notwithstanding a definite increase of surface to be cleaned each year, the yardage of sweepings steadily diminished in place of increasing as it would have done, all other things having been equal. In terms of cubic yards per block the machine sweepings are as follows: 1911—0.38 cubic yards, in 1914—0.31 cubic yards, and in 1919—0.13 cubic yards. It needs no great effort of the imagination to picture to oneself, the vast difference this steady and great decrease of surface refuse has made in the food supply of the English Sparrow. The push cart sweepings were and are practically all horse droppings, and were and are

gathered almost entirely in the business districts. Of the *combined* yardage of machine and push cart sweepings in 1914 and 1919, about 30% is charged against the push carts. Assuming this ratio to have held true in 1911 (in truth probably a low estimate), calculating the push cart sweepings for 1911 from its total sweepings by this ratio, and tabulating all three years, it appears that in 1911 there were 1.61 cubic yards, push cart sweepings per block, in 1914 there were 0.96 cubic yards per block, and in 1919 there were 0.71 cubic yards per block. These data mean that there was a diminution of 56% in the amount of horse droppings from 1911 to 1919. Expressed in actual cubic yardage of sweepings, they mean that from the same number of blocks swept by push cart men in 1911, 1260 cubic yards, in 1914, 1003 cubic yards and in 1919, only 474 cubic yards were gathered, all of which indicates that nearly 786 cubic yards of clear horse manure have thereby been gradually substracted from the daily, food supply of the English Sparrows inhabiting those areas. These data are more or less official and are at least approximately correct and accurate, and illustrate in a convincing manner, the truth of the belief that there has been wrought a great change in the urban sparrow's food supply during the past ten years. It would thus appear that there is ample cause alone, in the great diminution of the food supply, to explain the notable decrease of English Sparrows in Denver.

Obviously there is but one cause to which one can attribute the great shrinkage in the equine population of this city, namely the displacement of the harnessed horse by the motor vehicle; it is something unexpected to realize that an advance of civilization can bring about a beneficial change in the biology of a large city. While it has been almost unnoticed, it has been none the less certain and effective; the self-propelled vehicles of a city affect the sparrow not only through starvation, but probably also through making the species's street life so hazardous and fatal as to drive it largely out of the business areas.

It would be of interest to know if like conditions prevail in other large cities of this country.

Since this was written, November, 1919, there appears, to the writer, to have been a steady diminution of English Sparrows in

Denver, though at a slackened rate. The horse population of Denver as last reported, February, 1921, was 347, and that the displacement of horses in this and other urban areas is still going on, probably at an accelerated rate, seems indisputable. It was reported in March, 1921, in the public press, that motor trucks had increased in New York City to 68,000, an increase bringing about an actual, and a potential, displacement of hundreds, if not thousands, of horses; in fact the ton capacity of these 68,000 trucks, it is said, would employ 1,260,000 horses. The facts herein reported seem of especial importance to our western states, notably California, and it appears to the writer that in these states persistent and thorough attention to suppressing or removing adventitious food supplies of the English Sparrow will give gratifying results in preventing the establishment, and the spread and increase of this pest.

Conclusions:

- 1—That there are fewer English sparrows in Denver than ten years ago.
- 2—That there has been a notable decrease in the horse population of Denver during the past five years.
- 3—That there has been a very patent diminution in the amount of sweepings gathered from the streets of Denver during the past decade.
- 4—That the reduction in street sweepings has resulted in diminishing Denver's English Sparrow population by starvation.
- 5—That all of the above results hinge on the introduction, and multiplied uses, of the motor vehicle.

*1159 Race St., Denver, Colo.*

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## A LIST OF THE BIRDS OF ROYAL PALM HAMMOCK, FLORIDA.

BY ARTHUR H. HOWELL.

Royal Palm Hammock—known also as Paradise Key—is an island or 'Key' situated on the eastern edge of the Everglades in southern Dade County, about 11 miles southwest of Homestead.